

What is claimed is:

1 1. A video data transmission/reception system comprising a
2 transmission-side apparatus and a plurality of reception
3 terminals, the transmission-side apparatus transmitting video
4 data that has been compressed using motion compensation
5 interframe prediction, and the reception terminals receiving
6 the video data and decoding the received video data, wherein

7 the transmission-side apparatus includes:

8 a first encoding unit operable to apply intraframe
9 encoding processing or interframe encoding processing to each
10 of a plurality of frames of moving image data, to generate the
11 video data;

12 a second encoding unit operable to apply, in parallel with
13 the encoding processing by the first encoding unit, intraframe
14 encoding processing to a frame of the moving image data, to
15 generate substitute I frame data; and

16 a transmission unit operable to transmit the video data
17 and the substitute I frame data to the plurality of reception
18 terminals,

19 wherein when the transmission unit is to resume
20 transmission of the video data to one of the reception terminals
21 after temporarily interrupting transmission of the video data
22 to the reception terminal, the transmission unit transmits at

23 least one frame's worth of the substitute I frame data to the
24 reception terminal before resuming transmission of the video
25 data, and

26 the reception terminal, when the transmission unit is to
27 resume the temporarily interrupted transmission of the video
28 data, receives the transmitted substitute I frame data, decodes
29 the received substitute I frame data, and uses the decoded
30 substitute I frame data as reference frame data to decode video
31 data that is received after resumption of transmission.

1 2. A video data transmission apparatus that transmits video data
2 that has been compressed using motion compensation interframe
3 prediction to a plurality of reception terminals, comprising:

4 a first encoding unit operable to apply intraframe
5 encoding processing or interframe encoding processing to each
6 of a plurality of frames of moving image data, to generate the
7 video data;

8 a second encoding unit operable to apply, in parallel with
9 the encoding processing by the first encoding unit, intraframe
10 encoding processing to a frame of the moving image data, to
11 generate substitute I frame data; and

12 a transmission unit a transmission unit operable to
13 transmit the video data and the substitute I frame data to the
14 plurality of reception terminals, and when the transmission

15 unit is to resume transmission of the video data to one of the
16 reception terminals after temporarily interrupting
17 transmission of the video data to the reception terminal, the
18 transmission unit transmits at least one frame's worth of the
19 substitute I frame data to the reception terminal before
20 resuming transmission of the video data.

1 3. The video data transmission apparatus of Claim 2, further
2 comprising:

3 an option data transmission unit operable to transmit
4 option video data to the reception terminal, in parallel with
5 the transmission of the video data,

6 wherein the interruption of video data transmission to
7 the reception terminal is caused by the transmission of the
8 option video data.

1 4. The video data transmission apparatus of Claim 3, wherein
2 the option data transmission unit

3 includes an information collection sub-unit operable to
4 collect, from each of one or more of the reception terminals,
5 information about preferences of a user of the reception
6 terminal, and

7 based on the collected information, selects contents of
8 option data to be transmitted.

1 5. The video data transmission apparatus of Claim 3, wherein
2 the transmission unit
3 includes

4 a broadcast transmission sub-unit operable to
5 broadcast a same data to a plurality of transmission
6 destinations; and

7 an individual transmission sub-unit operable to
8 transmit individual data to an individual transmission
9 destination, and

10 uses the broadcast transmission sub-unit to transmit the
11 video data, and the individual transmission sub-unit to
12 transmit the substitute I frame data, and

13 the option data transmission unit transmits the option
14 video data in an individual transmission manner.

1 6. The video data transmission apparatus of Claim 5, wherein
2 the transmission unit includes

3 a switch sub-unit operable to exempt a reception terminal
4 to which substitute I frame data or option video data is being
5 transmitted from being a target of transmission of the video
6 data by the broadcast transmission sub-unit.

1 7. The video data transmission apparatus of Claim 3, wherein

2 the option data transmission unit includes
3 an insertion sub-unit operable to transmit secondary
4 option data part way through transmission of the option data;
5 and

6 a third encoding sub-unit operable, after transmission
7 of the secondary option data ends and before transmission of
8 the option data resumes, to generate option data substitute I
9 frame data that corresponds to at least one frame of the option
10 data starting from a frame that is a first frame after
11 transmission resumption,

12 wherein when transmission of the option data is to resume
13 after the transmission of the secondary option data ends, the
14 option data transmission unit transmits the option data
15 substitute I frame data to the reception terminal before
16 transmission of the option data resumes.

1 8. The video data transmission apparatus of Claim 2, wherein
2 the first encoding unit and the second encoding unit are
3 realized in separate encoders.

1 9. The video data transmission apparatus of Claim 2, wherein
2 the transmission unit determines how many frames of
3 substitute I frame data to transmit to the reception terminal
4 before resuming transmission of the video data, based on a GOP

5 structure of the video data, and in particular, based on a
6 frequency of appearance of frames having an I attribute or a
7 P attribute.

1 10. A video data transmission apparatus that transmits video
2 data that has been compressed using motion compensation
3 interframe prediction to a plurality of reception terminals,
4 comprising:

5 a first encoding unit operable to apply intraframe
6 encoding processing to a frame of moving image data, to generate
7 intraframe encoded video data;

8 a second encoding unit operable to apply interframe
9 encoding processing to a frame of moving image data, to generate
10 interframe encoded video data;

11 a video data generation unit operable to generate the
12 video data from the intraframe encoded video data and the
13 interframe encoded video data; and

14 a transmission unit operable to transmit the video data
15 to the plurality of reception apparatuses,

16 wherein when the transmission unit is to resume
17 transmission of the video data to one of the reception terminals
18 after temporarily interrupting transmission of the video data
19 to the reception terminal, the transmission unit transmits at
20 least one frame's worth of the intraframe encoded video data

21 to the reception terminal as substitute I frame data before
22 resuming transmission of the video data.

1 11. A video data transmission/reception system comprising a
2 plurality of video data provision apparatuses, a plurality of
3 reception terminals, and a distribution server, the video data
4 provision apparatuses transmitting video data that has been
5 compressed using motion compensation interframe prediction,
6 each reception terminal receiving the video data from any one
7 of the video data provision apparatuses and decoding the
8 received video data, and the distribution server conveying the
9 video data between the video data provision apparatuses and the
10 reception terminals, wherein

11 each video data provision apparatus includes:

12 a first encoding unit operable to apply intraframe
13 encoding processing or interframe encoding processing to each
14 of a plurality of frames of moving image data, to generate the
15 video data; and

16 a second encoding unit operable to apply, in parallel with
17 the encoding processing by the first encoding unit, intraframe
18 encoding processing to each of a plurality of frames of the
19 moving image data, to generate substitute I frame data, and

20 the distribution server includes:

21 a switch request reception unit operable to receive a

22 request from one of the reception terminals to switch video data
23 received by the reception terminal to different video data; and
24 a switch transmission unit operable, on the switch
25 request reception unit receiving the request, to stop
26 transmission of the video data being transmitted to the
27 request-originating user terminal, obtain substitute I frame
28 data from a video data provision apparatus that is to provide
29 the different video data, transmit the obtained substitute I
30 frame data to the user terminal, and transmit the different
31 video data to the user terminal.

1 12. A distribution server in a video data
2 transmission/reception system that further includes a
3 plurality of video data provision apparatuses and a plurality
4 of reception terminals, the video data provision apparatuses
5 transmitting video data that has been compressed using motion
6 compensation interframe prediction, each reception terminal
7 receiving video data from any one of the video data provision
8 apparatuses, and the distribution server conveying the video
9 data between the video data provision apparatuses and the
10 reception terminals, the distribution server comprising:

11 a switch request reception unit operable to receive a
12 request from one of the reception terminals to switch video data
13 received by the reception terminal to different video data; and

14 a switch transmission unit operable, on the switch
15 request reception unit receiving the request, to stop
16 transmission of the video data being transmitted to the
17 request-originating user terminal, obtain substitute I frame
18 data from a video data provision apparatus that is to provide
19 the different video data, transmit the obtained substitute I
20 frame data to the user terminal, and transmit the different
21 video data to the user terminal.

1 13. A video data provision apparatus in a video data
2 transmission/reception system that includes a plurality of
3 video data provision apparatuses, a plurality of reception
4 terminals, and a distribution server, the video data provision
5 apparatuses transmitting video data that has been compressed
6 using motion compensation interframe prediction, each
7 reception terminal receiving video data from any one of the
8 video data provision apparatuses, and the distribution server
9 conveying the video data between the video data provision
10 apparatuses and the reception terminals, the video data
11 provision apparatus comprising:

12 a first encoding unit operable to apply intraframe
13 encoding processing or interframe encoding processing to each
14 of a plurality of frames of moving image data, to generate the
15 video data;

16 a second encoding unit operable to apply, in parallel with
17 the encoding processing by the first encoding unit, intraframe
18 encoding processing to each of a plurality of frames of the
19 moving image data, to generate substitute I frame data; and
20 a transmission unit operable to transmit the video data
21 to the distribution server, and, when one of the reception
22 terminals requests to switch video data being received to the
23 video data being transmitted by the transmission unit, transmit
24 at least one frame of substitute I frame data to the reception
25 terminal via the distribution server, before the switch.

1 14. An encoder that compresses moving image data using motion
2 compensation interframe prediction, comprising:

3 a first encoding unit operable to apply intraframe
4 encoding processing or interframe encoding processing to each
5 of a plurality of frames of moving image data, to generate the
6 video data; and

7 a second encoding unit operable to apply, in parallel with
8 the encoding processing by the first encoding unit, intraframe
9 encoding processing to each of a plurality of frames of the
10 moving image data, to generate substitute I frame data.

1 15. An encoder that compresses moving image data using motion
2 compensation interframe prediction, comprising:

3 a first encoding unit operable to apply intraframe
4 encoding processing to a frame of moving image data, to generate
5 intraframe encoded video data;

6 a second encoding unit operable to apply interframe
7 encoding processing to a frame of moving image data, to generate
8 interframe encoded video data;

9 an encoded video data generation unit operable to
10 generate encoded video data from the intraframe encoded video
11 data and the interframe encoded video data; and

12 a substitute data generation unit operable to generate
13 substitute I frame data from the intraframe encoded video data.

1 16. A video data transmission/reception method used by a
2 transmission-side apparatus and one of a plurality of reception
3 terminals in a video data transmission/reception system in
4 which the transmission-side apparatus that transmits video data
5 that has been compressed using motion compensation interframe
6 prediction, and the plurality of reception terminals receive
7 the video data and decode the received video data, the method
8 comprising:

9 a first encoding step, in the transmission-side apparatus,
10 of applying intraframe encoding processing or interframe
11 encoding processing to each of a plurality of frames of moving
12 image data, to generate the video data;

13 a second encoding step, in the transmission-side
14 apparatus, of applying, in parallel with the first encoding step,
15 intraframe encoding processing to each of a plurality of frames
16 of the moving image data, to generate substitute I frame data;
17 a video data transmission step, in the transmission-side
18 apparatus, of transmitting the video data to a reception-side
19 apparatus;
20 a transmission interruption step, in the
21 transmission-side apparatus, of interrupting transmission of
22 the video data to the reception-side apparatus;
23 a substitute data transmission step, in the
24 transmission-side apparatus, of transmitting at least one
25 frame's worth of the substitute I frame data to the reception
26 terminal;
27 a substitute data decoding step, in the reception
28 terminal, of decoding the substitute I frame data;
29 a video data retransmission step, in the transmission
30 side apparatus, of resuming transmission of the video data to
31 the reception terminal; and
32 a video data decoding step, in the reception terminal,
33 of decoding the video data received after resumption of
34 transmission, using data obtained as a result of executing the
35 substitute data decoding step, as reference frame data.

1 17. A program for having executed in a computer a video data
2 transmission method used by a transmission-side apparatus in
3 a video data transmission/reception system in which the
4 transmission-side apparatus that transmits video data that has
5 been compressed using motion compensation interframe
6 prediction, and a plurality of reception terminals receive the
7 video data and decode the received video data, the method
8 comprising:

9 a first encoding step of applying intraframe encoding
10 processing or interframe encoding processing to each of a
11 plurality of frames of moving image data, to generate the video
12 data;

13 a second encoding step of applying, in parallel with the
14 first encoding step, intraframe encoding processing to each of
15 a plurality of frames of the moving image data, to generate
16 substitute I frame data;

17 a video data transmission step of transmitting the video
18 data to a reception-side apparatus;

19 a transmission interruption step of interrupting
20 transmission of the video data to the reception-side apparatus;

21 a substitute data transmission step of transmitting at
22 least one frame's worth of the substitute I frame data to the
23 reception terminal; and

24 a video data retransmission step of resuming transmission

25 of the video data to the reception terminal.